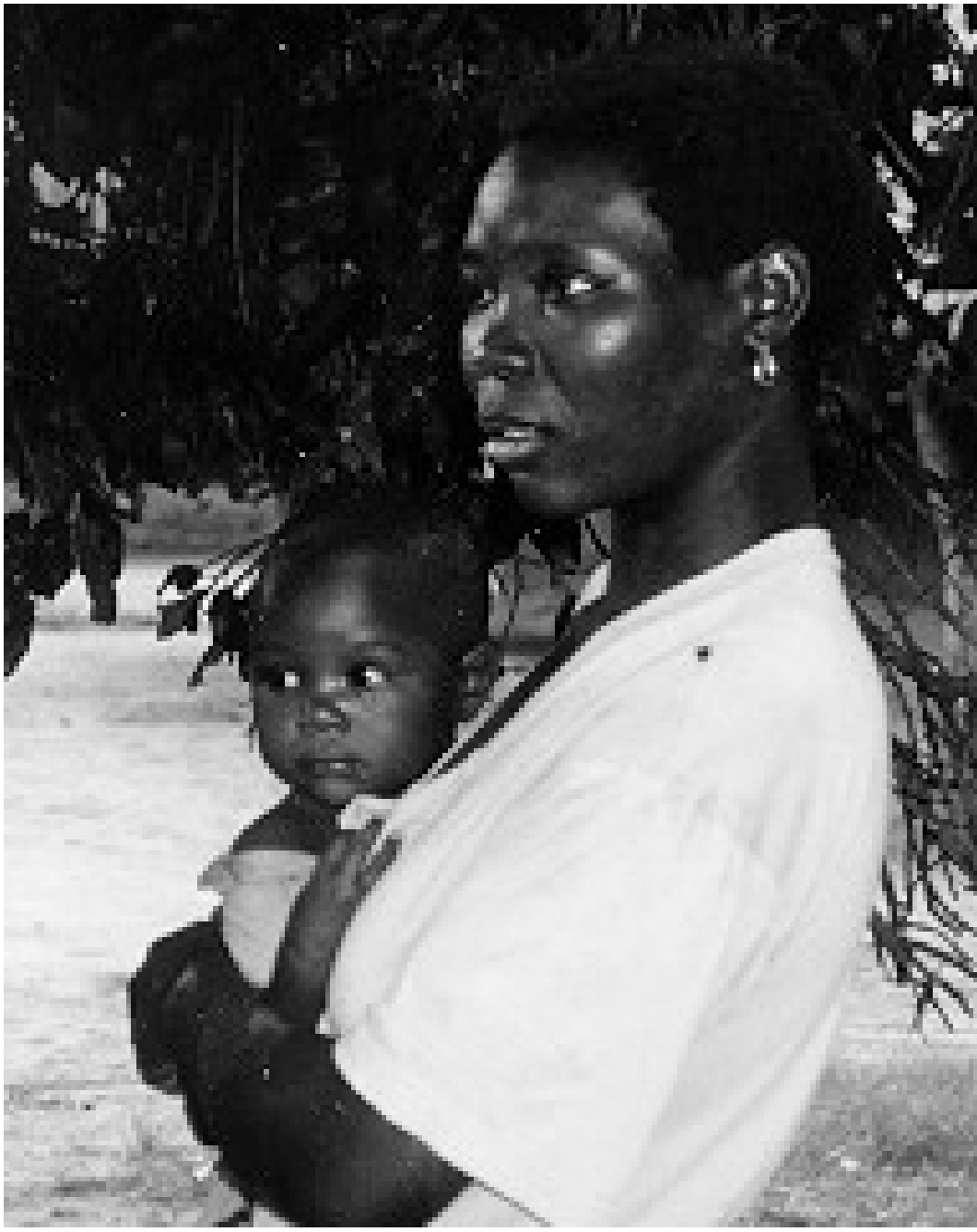
GENDER DIFFERENCES AMONG CHILDREN 0–5 YEARS:

AN OPPORTUNITY FOR CHILD SURVIVAL INTERVENTIONS

A Review Paper Prepared for the BASICS Project
By Kathleen M. Kurz and Charlotte Johnson-Welch



BASICS

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A Review Paper Prepared for the BASICS Project

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Abstract:
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Increasing attention in the developing world has been devoted to the girl-child. There is a scarcity of information on gender differences among children under the age of 5. It is important to focus on possible gender bias among young children so that child survival interventions benefit girls as much as they do boys. A literature review was conducted that found: few studies disaggregated health and nutrition data of underfives by gender; gender-disaggregated data give a mixed report on the direction of gender bias; few insights explaining gender differences emerged from a review of the health and nutrition literature; a common way in which gender bias manifests is that girls tend not to be taken for health care as often or as early in their illness as boys; girls may receive less attention from parents; first-born girls may be healthier than their younger sisters; increasing household income and increasing mothers' education are not sufficient to reduce gender disparities; and interventions can be designed and implemented to overcome gender biases. The authors conclude that child survival efforts are well placed to help reduce gender differences in the health and nutrition of underfives as follows: By determining if there are gender-biased behaviors or gender-differential outcomes; by investigating why the gender differences occur; by developing and testing interventions to reduce gender differences; and by sharing lessons learned and developing a consensus about reducing gender differences.

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CONTENTS

In recent years, increasing attention in the developing world has been devoted to the *girl-child* (0–19 years old). However, although information on the girl-child has expanded, the scarcity of information on gender differences among children under the age of 5 is disconcertingly scarce. Underlying the interest is the question of whether female children face bias stemming from socio-cultural and economic practices. It is important to focus on possible gender bias among underfives to ensure that child survival interventions benefit girls as much as they do boys. This paper is a review of the literature on gender differences in health and nutrition among children under 5 years of age in the developing world. Five questions are addressed:

- To what extent are gender-disaggregated data available on the health and nutrition of underfives?
- What is the extent of gender disparity in health and nutritional status among underfives?
- What factors influence gender disparities in underfive health and nutritional status?
- What has been learned from intervention studies about reducing gender differences?
- Are these gender disparities more prevalent in some regions than in others?

Information was sought on mortality and morbidity patterns, health care practices, nutritional status, feeding practices, and psychosocial development. Data were collected from three sources: national-level statistical reports, all articles reporting health and nutritional data for children that appeared in six journals from a recent two-year period, and articles from a traditional search using key words including "gender."

The review indicated that gender differences in the health and nutrition of underfives exist in every region and were reflected more often in smaller studies than in national-level statistics. Bias against girls was shown consistently for three health and nutrition topics: health care utilization, feeding patterns, and attention from care providers. These three topics are all sets of behaviors that could serve as entry points for interventions to reduce gender disparities. There were also examples of gender differences in morbidity and nutritional status, with the Helen Keller International Nutritional Surveillance Project in Bangladesh providing a good set of longitudinal data. Finally, the literature also suggested gender bias in mortality data. The foremost source of these data were the Demographic and Health Surveys (DHS) country reports and National Family Health Surveys (NFHS) reports for the states of India, particularly after statistical adjustments as suggested by Hill and Upchurch (1995).

The main results of the literature review include the following observations:

- Few studies disaggregated health and nutrition data of underfives by gender.
- Gender-disaggregated data gave a mixed report in the direction of gender bias.
- Few insights explaining gender differences emerged from a review of the health and nutrition literature.
- A common way in which gender bias manifests itself is that girls tend not to be taken for health care as often or as early in their illness as boys.
- Girls may receive less or poorer quality food than their brothers.

- Girls may receive less attention from parents.
- First-born girls may be healthier than their younger sisters.
- Increasing household income and increasing mothers' education are not sufficient to reduce gender disparities.
- Interventions can be designed and implemented to overcome gender biases.

The data do not warrant drawing firm conclusions from these findings on the extent of gender disparity in underfive health and nutrition because so little of the literature presents data disaggregated by gender. Nor do they warrant drawing conclusions on the factors influencing these gender disparities because so few qualitative data have been collected that could identify the reasons for gender bias and related behavior and the influences underlying them.

Child survival efforts are well placed to help reduce gender differences in the health and nutrition of underfives as follows:

1. By posing and answering this question: Are there gender-biased behaviors or gender-differential outcomes?
2. By asking why the gender differences occur.
3. By developing and testing interventions to reduce gender differences.
4. By sharing lessons learned and developing a consensus about reducing gender differences.

As a result of the recognition that boys and girls are treated differently throughout their lives, an increasing amount of international attention has been devoted to the *girl-child*. Often, gender differences are a result of perceived appropriate male and female child roles and responsibilities (UNICEF 1993; 1991). Issues raised by a focus on the girl-child are equal educational opportunities, female genital mutilation, child prostitution, child labor, domestic work burden, gender-based violence, unintended pregnancy, and infection with sexually transmitted diseases. These key topics suggest a focus on a girl-child who is older than 5, even though the age of a girl-child is technically 0 to 19. After age 5, differences in adult attitudes and expectations toward girls and boys become apparent. Girls often are expected to perform different domestic chores from boys—ones that keep girls closer to home and may take more time than boys' chores. These expectations may prevent girls from attending school or from engaging in other activities that contribute to their social, physical, and cognitive development (Kurz and Prather 1995).

The focus on the older girl-child has meant that the girl-child of the 0- to 5-year-old-age group ("underfives") has received insufficient attention. One important reason for this focus may be an assumption that cultural perceptions and practices that lead to gender differences only appear once the girl-child has reached an age when she can contribute to the family's domestic welfare.

However, many child health specialists suspect that factors underlying these disadvantages are already present in younger years. In fact, there is a troublesome amount of evidence that underfive girls in some developing countries have higher mortality and poorer health and nutritional status than boys (HKI 1994; Ravindran 1986). It is important to consider gender differences among children under age 5 to ensure that participation in child survival interventions that target this age group benefit girls as much as boys. Although not usually focused on the girl-child, child survival projects are well placed to identify and address any gender differences in the health and nutrition of underfive children.

The purpose of this paper is to provide background information that child survival programs can use to decide whether and how to address gender disparities among the underfive children they serve. Persistent reports of gender differences in health and nutrition outcomes among underfive children are evaluated. Five main questions are asked:

- To what extent are gender-disaggregated data available on the health and nutrition of underfives?
- What is the extent of gender disparity in health and nutritional status among underfives?
- What factors influence gender disparities in health and nutritional status?
- What has been learned from intervention studies about reducing gender differences?
- Are these gender disparities more prevalent in some regions than in others?

In the following sections, information sources are described briefly; then findings from the literature reviews are grouped into nine main results. Discussion and recommendation sections follow.

The study entailed reviewing the literature for gender differences in health and nutrition outcomes by region (Sub-Saharan Africa, Asia, the Middle East and North Africa, and Latin America and the Caribbean), by health and nutrition categories, and by factors related to the outcomes.

Health and nutrition information was sought for six categories:

1. Mortality: infant mortality (0–1 years), child mortality (1–5 years), and underfive mortality (0–5 years)
2. Morbidity incidence: incidence of diarrheal disease, respiratory infection, measles, malaria, or fever.
3. Health care practices: immunization rates, health care seeking behavior, oral rehydration therapy.
4. Nutritional status: weight-for-age, height-for-age, weight-for-height, anemia, vitamin A deficiency, growth monitoring and promotion.
5. Feeding practices: supplementation, quantity of food, quality of food, breastfeeding, order of feeding, and nutrition education.
6. Psychosocial development: interaction with parents, participation in child development programs, and cognitive development measures.

Information was collected from three sources. The first was national-level statistical reports, usually compiled by multilateral or bilateral agencies, including the United Nations, The World Bank, and the United States Agency for International Development (USAID). The most important source was the DHS because the data sets collected from each of the approximately 50 countries are nationally representative and comparable across countries. Information from these national reports was useful in determining the extent to which data are gender-disaggregated and the extent of gender disparities among underfives.

The second source included all articles from six journals that reported health and nutrition data for underfives between June 1993 and May 1995.[1] This source provided evidence about the extent of gender-disaggregation and whether boys or girls are worse off in health and nutrition.

One hundred thirty articles were identified and reviewed. This review explores the extent to which gender differences were considered in articles on health and nutrition in the age group, and the direction of those differences. The six journals were reviewed to avoid relying only on traditional reviews, from which much is learned about cases in which there are gender disparities disadvantageous to girls, but not about those in which there are no such gender disparities. Articles from the six journals tend to report on specific research studies, generally at a subnational level, complementing the national-level data sources.

The third source was articles identified through a traditional literature search using key words such as “gender,” “child,” “health,” and “nutrition.” This source provided evidence on the factors contributing to gender differences in health and nutrition of children in this group. Neither the source of the publications nor the year in which they were published was limited. Because so few articles from the review of the six journals focused on gender differences, this third source is a different set of literature from that found in the six journals and hence complements

[1]Journals were chosen from a variety of disciplines: pediatrics (*Journal of Tropical Pediatrics*), nutrition (*American Journal of Clinical Nutrition*), anthropology (*Human Organization*), social science/public health (*Social Science and Medicine*), demography (*Population and Development Review*), and psychosocial development (*Child Development*). Four journals were known to feature articles on gender differences because they were referenced most often in an earlier review of gender differences in health and nutrition outcomes of preschoolers in developing countries (Ravindran 1986). The other two were most likely to feature articles on preschooler health and nutrition in the fields of anthropology and psychosocial development. A high proportion of articles emerged from the *Journal of Tropical Pediatrics* (77), the *American Journal of Clinical Nutrition* (27), and *Social Science and Medicine* (13).

the articles in them. The articles identified through this key word search allowed us to identify factors influencing gender disparities and the extent to which intervention studies can reveal ways to reduce those disparities.

FEW STUDIES DISAGGREGATED HEALTH AND NUTRITION DATA OF UNDERFIVES BY GENDER

The review indicated that there is a range of gender-disaggregation among national-level statistical reports on health and nutrition outcomes among children 0 to 5 years (Table 1). The USAID summary, *Child Survival: Report to Congress on the USAID Program*, and the development report from the United Nations Development Program (UNDP) provide no gender-disaggregated data, whereas development reports from other UN agencies gender-disaggregate some but not all of the variables they report.

The largest amount of gender-disaggregated data was found in the country reports from the DHS. The greatest advantages of the DHS data compared with those of other national-level sources are their national representativeness and their comparability in collection and analysis procedures. For the other national-level sources, reported data may have been compiled from a variety of sources, which may not have been nationally representative. Sometimes these data are from administrative records, which are considered somewhat unreliable, or they are extrapolated or estimated. The only limitation of the DHS data for cross-national comparison is that surveys have not been conducted in all countries.

In addition to the national-level reports, the review of six journals on underfive health and nutrition revealed inadequate gender-disaggregation. Fifty of the articles were from Asia, 34 from Sub-Saharan Africa, 19 from the Middle East and North Africa, 18 from Latin America and the Caribbean, and 9 reported data from more than one region. Of the 130 articles, only 35 percent (45 articles) reported gender-disaggregated health and nutrition results (Figure 1 and Table 2). In the remaining 65 percent of the articles in which the health and nutrition data were not gender-disaggregated, but sex of the study subjects was obviously collected (i.e., the number of female and male participants was reported), it is not known whether health differences were not considered or investigated, or were not found and thus not reported. This oversight seriously limits an examination of the extent of gender differences in underfive health and nutrition. Note that 35 percent is a generous estimate of the extent of gender-disaggregation, because articles were included in this count if one, but not all, of the variables investigated was reported separately for boys and girls.

The percentage of articles with gender-disaggregated data varied by region (Figure 1 and Table 2). The articles from Latin America and the Caribbean contained the least

Table 1.
Extent of Gender Disaggregation in International Sources of Cross-National Data on Underfive Health and Nutrition

Source	Mortality	Morbidity	Nutritional Status
USAID Child Survival Reports	No	No	No
World Bank Development Reports	Yes[1]	No[2]	N/A
UNDP Human Development Reports	No	N/A	No
WHO, *Women, Health and Development*	N/A	Yes	Yes
UN, *The World's Women*	Yes	Yes	N/A
UNICEF, *Children & Women in India: A Situation Analysis*	Yes	No	Yes
Demographic & Health Surveys Country Reports	Yes	Yes	Yes

[1] Reports from 1991 to 1994 were reviewed; the 1993 *World Development Report*, *Investing in Health* also disaggregated causes of death.

[2] Only the 1993 *World Development Report* disaggregated "disease burdens" by gender.

Figure 1.
Articles with Gender-Disaggregated Data

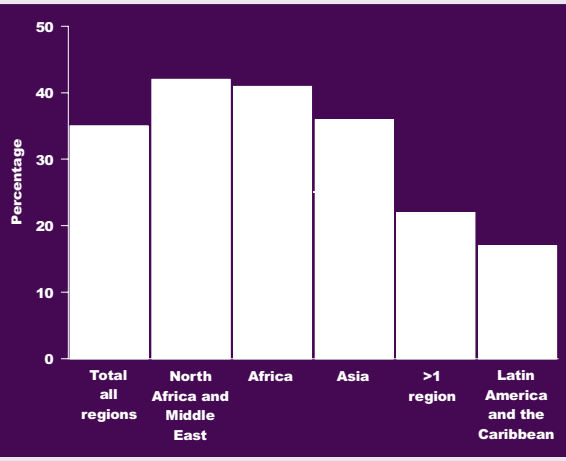


Table 2.
Extent of Any Gender Disaggregation and Any Gender Differences in Articles on Underfive Health and Nutrition, by Region

Region	Number	Number of Articles with Any Variable Gender-Disaggregated		No Difference between Girls and Boys in Any Variable		Girls Worse Off in Any Variable		Boys Worse Off in Any Variable	
		n	percent	n	percent	n	percent	n	percent
Sub-Saharan Africa	34	14*	41	10	71	3	21	0	0
Asia	50	18*	36	4	22	8	44	5	28
Middle East and N. Africa	19	8	42	2	25	3	38	3	38
Latin America Caribbean	18	3	17	2	67	0	0	1	33
More than 1 region	9	2	22	0	0	1	50	1	50
Total	**130**	**45**	**35**	**18**	**39**	**15**	**33**	**10**	**22**

*For one of these articles, data are missing on whether girls or boys were worse off or there was no difference.

disaggregation (22 percent, or 4 of 18 articles), while the articles from the Middle East and North Africa (42 percent, or 8 of 19 articles) and from Sub-Saharan Africa (41 percent or 14 of 34 articles) contained the most. Of note is that in Asia, parts of which are well known for widespread preference for boys, only 36 percent of articles were gender-disaggregated.

Alternatively, a tally of the number of references to each health and nutrition topic— morbidity, health care, nutritional status, feeding practices, and psychosocial development—in the six journals showed that an even lower proportion (26 percent) was gender-disaggregated (Table 3) than the tally of articles. The percentage of gender-disaggregation also varied among the health and nutrition topics. The most gender disaggrega- tion occurred in the data on mortality (35 percent, or 6 of 17 times), health care practices (30 percent, or 8 of 27 times), and nutritional status (32 percent, or 25 of 77 times). The percentage was also high for psychosocial development, but this topic was addressed too few times in an article to allow any conclusions to be drawn (Table 3).

GENDER-DISAGGREGATED DATA GAVE A MIXED REPORT ON THE DIRECTION OF GENDER BIAS

A key question posed in this review was, What is the extent of gender disparity in health and nutritional status among children under age 5? The specific comparisons and compilations needed to answer this question comprehensively, however, could not be made because of the variety of objectives, measurement techniques, and indicators in the articles from the review of the six journals. Using the national-level reports from the DHS and the 45 articles from the review of the six journals with gender-disaggregated data, this question was rephrased as, How often do studies suggest that girls are worse off, that boys are

worse off, or that there are no gender differences in health and nutrition?

DHS data for 45 countries and National Family Health Surveys (NFHS) data for 14 states of India were examined for gender differences in four areas: first, mortality rates for three age groups; second, frequency of seeking health care for three childhood diseases; third, frequency of receiving four immunizations; and fourth, the prevalence of low nutritional status using three anthropometric indicators (Appendix A[2] and B). Among the 45 countries, the only notable gender differences at the national level are in mortality rates. Infant mortality is higher among boys in most countries. The exceptions are Madagascar, Jordan, Tunisia, Colombia, and Trinidad, where there were no gender differences. Child mortality is higher among girls in Bangladesh, Pakistan, Egypt, and three Sub-Saharan African countries (Burundi, Cameroon, and Niger). There are no gender differences in child mortality in many of the countries, however, and child mortality is higher among boys in five Sub-Saharan African countries.

Hill and Upchurch (1995) drew firmer conclusions about gender bias in DHS mortality data after they calculated and adjusted for boys' biologically determined higher mortality rates in the first year of life. Life table data from Europe and New Zealand, 1820–1964, were used as a reference to estimate the ratio of girls' mortality to that of boys. The choice of reference data from these places was based on the assumption that any discrimination against girls was minimal as it affected mortality. The ratio of girls' mortality to boys' varied by age and by boys' mortality rate. Once these two sources of variability are taken into account, standardized cross-national comparisons of the ratios were possible. The overall ratio was calculated as 0.8; that for every 10 boys who die before their fifth birthday, only eight girls die. Girls had a greater advantage (lower female:male ratio) in the first year of life (infant mortality) compared with the next four years (young child mortality). Girls also had a lower female to male ratio as mortality rates declined. Applying these adjustments to DHS mortality data, Hill and Upchurch found excessive female mortality (evidence of girls' sociocultural vulnerability) in almost all of the 35 countries for which data were available.

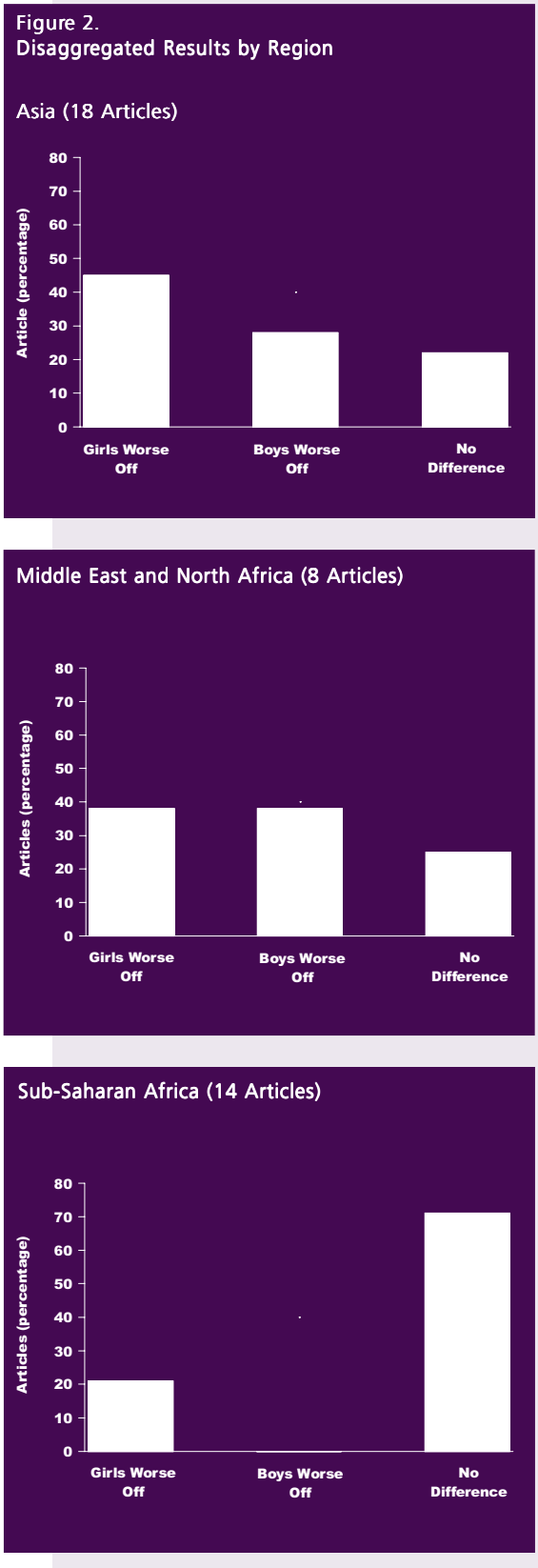
This study suggests that mortality studies without such adjustment for boys' biological disadvantage are underestimating girls' sociocultural disadvantage. The concept of separating biological from sociocultural vulnerability probably also applies to data on morbidity and nutritional status as does the suggestion that girls' sociocultural disadvantage is underestimated. Calculating similar adjustment figures for morbidity and nutritional status, however, would not be as straightforward as for infant and child mortality,

Table 3.
Extent of Gender Disaggregation and Gender Differences in the Articles, by Health Topic

Topic	Number of Times Topic Mentioned in the 130 Articles	Number of Times Topic Is Gender-Disaggregated		No Difference Between Girls and Boys on the Topic		Girls Worse Off on the Topic		Boys Worse Off on the Topic	
		n	percent	n	percent	n	percent	n	percent
Mortality	17	6	35	2	23	4	67	0	0
Morbidity	69	14	20	6	43	3	21	5	36
Health Care Utilization	27	8	30	2	25	4	50	2	25
Nutritional Status	77	25	32	12	48	7	28	6	24
Food & Feeding Practices	40	5	12	3	60	1	20	1	20
Psychosocial Development	8	3	38	3	100	0	0	0	0
Total	**238**	**61**	**26**	**28**	**46**	**19**	**31**	**14**	**23**

[2]We are grateful to Dr. Elisabeth Sommerfelt, of DHS, Macro International, for preparing the tables in Appendix A.

Figure 2.
Disaggregated Results by Region



because such figures are more difficult to assess.

The NFHS Indian data by state indicate that gender differences can emerge at the subnational level (Appendix B). Girls have much lower values for many of the health and nutrition variables than boys in two of the northern states (Uttar Pradesh and Haryana), and somewhat lower values in three central states (Gujarat, Madhya Pradesh, and Orissa). Their health care in the areas studied is on a par with boys in three southern states (Tamil Nadu, Karnataka, and Goa) and in Maharashtra. In Uttar Pradesh and Haryana, girls' child mortality rate is more than twice that of boys, and even infant mortality is higher for girls. Fewer girls than boys receive health care at a medical facility and immunizations, and girls have a higher prevalence of poor nutritional status. But the degree of gender difference is not as great in these areas as it is in mortality rates. In Gujarat, Madhya Pradesh, and Orissa, child mortality is 20 to 45 percent higher for girls. Fewer girls than boys receive health care and immunizations, and the degree of gender difference is no smaller for these variables than in the northern states. In the nutritional status data, there are no notable gender differences. There are no strong gender differences in any health variable studied in the southern states and in Maharashtra.

Among the 45 journal articles in which health and nutrition data were gender-disaggregated, some found no statistically significant differences between boys and girls, others found that girls had lower values for health and nutrition variables (girls "worse off"), and still others found that boys had lower values (boys "worse off").

Some patterns were notable within this mixed picture. Among the gender-disaggregated studies from Asia, there was a higher proportion of reports (45 percent) that girls were worse off in one or more health and nutrition variables than boys (and more than reports of no differences) (Figure 2 and Table 2). In the Middle East and North Africa, there were similar proportions of studies in which girls or boys were worse off (38 percent each). In Sub-Saharan Africa, there was a higher proportion of studies (71 percent) showing no significant differences between girls and boys (71 percent), and only 21 percent in which girls were worse off, but there were none in which boys were worse off. In Latin America and the Caribbean, there were too few ar-

ticles with any gender-disaggregated data to warrant conclusions (Table 2). In the proportion of studies indicating that girls were worse off than boys, Asia ranks first, the Middle East and North Africa rank second, and Sub-Saharan Africa, third; the data to rank Latin America and the Caribbean region were lacking.

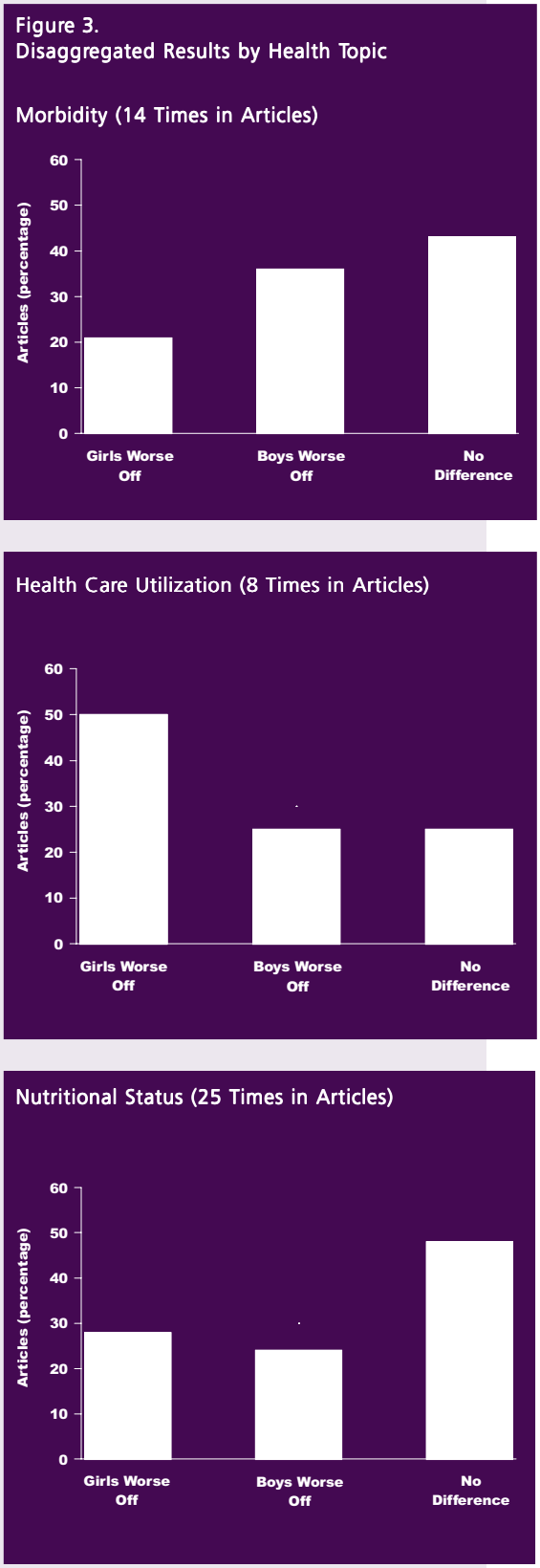
Results in the journal articles also varied by health and nutrition topic. Health care utilization was the area in which girls were most prominently worse off (Figure 3 and Table 3)—that is, a much higher proportion of studies showed that girls were reportedly taken for health care less often when they were sick (50 percent), whereas fewer showed that boys were taken less often when sick, or that there were no statistically significant differences. Girls were very often worse off as reported in articles on mortality—that is, there was a higher proportion of studies in which girls' mortality rates were higher than boys' (67 percent). However, there were too few articles assessing mortality for this result to be conclusive. For both morbidity and nutritional status, more studies showed no significant difference between girls and boys (43 percent and 48 percent of the studies, respectively), and the proportion of studies in which girls were worse off or boys were worse off was smaller than the proportion in which there was no difference. Within the categories of feeding practices and psychosocial development, the trend was for the highest proportion of studies to show no significant differences between girls and boys. But again, there were too few studies for these trends to be conclusive (Table 3).

Overall, the gender bias against girls demonstrated in health and nutritional outcomes of children occurs in a variety of settings. This bias may occur more often in Asia, the Middle East, and North Africa; yet, among data on health care practices and mortality, there is enough indication to conclude that gender differences can occur in any region and in any area of health and nutrition.

FEW INSIGHTS EXPLAINING GENDER DIFFERENCES EMERGED FROM THE REVIEW OF THE HEALTH AND NUTRITION LITERATURE

In addition to being counted as gender-disaggregated or not, and counted for the direction of the gender difference, the 130 articles from the six journals were reviewed

Figure 3.
Disaggregated Results by Health Topic



for any insights on factors contributing to gender disparities in the health and nutritional status of underfives.

Disappointingly few insights were obtained. No insights were expected from the two-thirds of articles in which results were not disaggregated by gender. Nor were insights expected from the 18 articles in which no differences between girls and boys were found because their authors did not hypothesize that gender disparities would exist. The lack of discussion in most of the remaining 25 articles in which either girls or boys were worse off according to a health or nutrition indicator, however, was disappointing.

The most common pattern among these 25 articles was that the gender difference finding was reported briefly in results sections of the articles but was not elaborated on in discussion sections. The implicit explanation for the lack of elaboration in several cases was that sex was either not a statistically significant factor influencing the outcome in a multivariate analysis, or it was less important than other factors. For example, in a study in Bangladesh, boys had a somewhat higher incidence of persistent diarrhea, but a multivariate analysis revealed that cell-mediated immune deficiency and malnutrition, not sex, were significant predictors of the persistent diarrhea, so the sex differences were not discussed (Baqui et al. 1993). Furthermore, in several articles, sex was described as a potential confounding variable to be controlled for in a multivariate analysis. By definition, whether or not it was a significant predictor, sex was not of main interest in the analysis and therefore was not discussed.

In several other cases, when the finding was reported briefly in results sections of the articles, but was not elaborated on in discussion sections, there was no apparent reason for not mentioning the sex difference. For example, a large vitamin A supplementation trial in Sudan found both that girls were more likely to die than boys even after results were controlled for other risk factors of mortality, and that increased vitamin A intake in girls was associated with a greater reduction in mortality than it was in boys (Fawzi et al. 1994). However, the article discussed neither the possible reasons nor the implications or recommendations related to this finding, although the discussion was otherwise thorough about the biological mechanisms of vitamin A status and childhood morbidities influencing childhood mortality. Another study on treatment of childhood diarrhea in rural Egypt found that boys were significantly more likely than girls to be taken to private physicians, who are preferred providers, for treatment of a diarrheal episode (Langsten and Hill 1995). This finding, as in the vitamin A study, was not elaborated on in the discussion, which is otherwise thorough about recommendations for appropriate medical treatment for the various forms of diarrheal disease promoted by a national health program.

A less common pattern among the 25 articles was that the finding of gender disparity is reported, but discussed only to say that such a finding is consistent with the finding of previous reports. For example, Bashour, Webber and Marshall (1994) reported that boys in their Syrian study had significantly higher prevalence and incidence of acute respiratory infections than girls, and pointed out that this finding corresponded to observations in other countries, citing two references that were over 10 years old. This kind of discussion, unfortunately, does not yield insight into the factors affecting gender disparities.

Two of the 25 articles had medical results that, while discussed, were too specific to be used further in this paper. In a study in Hong Kong, hepatitis B vaccine titers were higher for females than males, and the authors declared this to be the most intriguing finding from the study (Fang et al. 1994). They went on to discuss the mechanism by which female children exhibit a stronger immunogenic response than males. While this is a desirable level of discussion, it was too specific to be useful in this paper. In a study in India, investigators found that males whose mothers used smokeless tobacco during pregnancy had higher mortality rates during gestation than females, and recommended further controlled studies with larger samples to confirm these findings (Krishnamurthy and Joshi 1993).

However, four articles discussed gender differences in a health and nutrition context. The first is the analysis of DHS mortality data by gender, reported above (Hill and Upchurch 1995). The second examines sex differences in infant and child mortality and child feeding practices in three provinces in China, and it is the only article from the review of six journals that contributed to the discussion of factors influencing underfive health and nutrition in the Main Results section (Ren 1995). The third article investigates reasons for the increase in China's reported sex ratio at birth and suggests that prenatal sex selection accounts for much of the increase, while female infanticide and abandonment account for very little (Yi et al. 1993). Inasmuch as this paper did not focus on health and nutrition issues before birth, this article was not used further.

The final article in which gender differences were discussed was a brief evaluation of the nutritional impact of the Integrated Child Development Services (ICDS) Scheme, a large government program throughout India (Avsm et al. 1995). The study showed that nutritional status of both boys and girls improved after participation in the ICDS Scheme, but that girls were more malnourished than boys to the same degree whether they participated in the program or not. The authors discuss the gender difference only to say that "even though the ICDS scheme has provided some impetus to improve the nutritional status of the girl child, more attention is required to be given to this group to improve their health and nutrition." They do not, however, discuss the factors related to the gender disparity or the elements of the intervention in terms of persistent gender differences, so the article was not used further.

A COMMON WAY IN WHICH GENDER BIAS MANIFESTS ITSELF IS THAT GIRLS TEND NOT TO BE TAKEN FOR HEALTH CARE AS OFTEN OR AS EARLY IN THEIR ILLNESS AS BOYS

Although girls do not generally have a higher incidence of diarrheal or respiratory morbidity—reports suggest either that boys have a higher incidence (e.g., Sepúlveda, Willett and Muñoz 1988) or that there is no gender difference (e.g., Chen, Huq and D'Souza 1981)—there are numerous reports of lower health care utilization during illness for girls than boys. Information for this point and the rest of the Main Results section was obtained from the literature search using key words, including "gender" and "child."

In a Bangladesh study, physicians were consulted three times as often for boys' illnesses as for girls' illnesses. Also, drugs were purchased for boys' illnesses nearly twice as often as for girls', and nearly three times as often if the

drug was prescribed by a physician (Hossain and Glass 1988). In another Bangladesh study, expenditures for use of health care services were 64 percent higher for boys than for girls (Chaudhury 1988). Similarly, despite having the same rates of diarrheal disease and respiratory infection, boys were reportedly brought to health centers in Matlab Thana, Bangladesh, 67 percent more frequently than girls, even when the care was free (Chen, Huq and D'Souza 1981). Although respondents often cited perceived higher costs of health services for daughters than for sons as a reason for seeking less health care for daughters, in this case, factors other than ability to pay for services for all their children made parents delay taking their daughters to a care provider.

A hospital-based study in Yaoundé, Cameroon, found that girls under age 5 were twice as likely to be mildly malnourished and 1.5 times as likely to be moderately malnourished as boys, and that these rates were related to prior contact of the mother or child with the formal health care system (Defo and Young 1993). Furthermore, a study of hospital admissions in Lomé, Togo, indicated that 61 percent of all admissions of children under 5 years of age were boys. Boys 18 to 35 months old were admitted to the hospital at twice the rate of girls, and girls died at twice the rate of boys at the hospital. Within two days of admission, 6 percent of girls had died, but only 3 percent of boys had. The authors hypothesized that parents were bringing their daughters to hospitals later in their illnesses than they brought their sons (Locoh 1987).

Multivariate analysis of data from a nationally representative household survey conducted in Vietnam found that, after controlling for parental education and for household income and structure, girls under age 6 were significantly less likely to receive medical care than boys, although there was little difference in morbidity and nutritional status between girls and boys (Desai 1995). In addition, wealthier households were more likely to obtain formal health care for their children, but this finding was significant only for daughters. As household income increased, daughters were given more access to health care. Boys, on the other hand, obtained health care at all income levels, so there was no relationship between health care utilization and household income for boys.

Another relevant aspect of health care utilization is mothers' use of family planning. In a study in Egypt, mothers with sons were more likely to be using modern contraceptives, more likely to begin using them during an intervention trial, and more likely to continue using them after completion of the study (Gadalla, McCarthy and Campbell 1985). Similar results were indicated by the survey in Vietnam. Women with surviving sons from their first two births were more likely to space their third birth (Desai 1995).

GIRLS MAY RECEIVE LESS OR POORER QUALITY FOOD THAN THEIR BROTHERS

Another way gender bias manifests is that girls may receive less food or poorer quality food than their brothers, and that feeding practices indicate a preference for sons. In the study in Narangwal, India, the male:female ratio of intake of five nutrients all favored boys: 1.45 for calcium, 1.28 for Vitamin A, 1.19 for protein, 1.16 for energy, and 1.14 for iron (Pebley and Amin 1991), although dietary requirements are the same for girls and boys under 5 years old. From the same study, Pebley (1984) showed that being a girl and residing in a

poor household were the main two determinants of dietary intake, and that these determinants in turn explained the low nutritional status of children. Remarkably similar male:female intake ratios were calculated for energy (1.16) and protein (1.14) in a study in Bangladesh (Chen, Huq and D'Souza 1981). In the latter study, the authors went further to adjust the ratios for child weight in case the boys required more food because they weighed more, but this adjustment hardly cha-nged the energy or protein ratios.

Studies outside of South Asia also revealed gender differences in feeding practices. In a study in Indonesia, gender bias in energy intake favored boys. The energy intake of boys under age 5 was 42 percent higher (300 kcal/day greater) than for girls (Ralston, forthcoming). In the Institute of Nutrition of Central America and Panama study in El Progreso, Guatemala, boys between the ages of 2 and 5 consumed 59 kilocalories per day more than girls; and between ages 1 and 2, higher intake explained higher weight gains among boys than girls (Frongillo and Bégin 1993). In Panama, the dietary intake of boys 3 to 5 years old was greater than that of girls. A unique finding from the Panama study is that mothers who had jobs believed that their daughters needed more food and attention than their sons, and the income they earned explained both increased food expenditures and increased food intake by their daughters (Barbeau 1987).

Regarding breastfeeding duration and weaning practices, several studies suggested that optimal breastfeeding practices favored boys. Durations of exclusive breastfeeding that are either too short or too long can be suboptimal. In several Arab countries, girls were weaned before boys so that mothers could become pregnant sooner and possibly bear a son (Patai 1976), though the impact on their daughters' health and nutritional status was not assessed. In rural India near Pune, girls were breastfed exclusively for shorter periods than boys, and the shorter duration was associated with a higher prevalence of poor nutrition (Rao and Kanade 1992). In China, girls were breastfed exclusively longer than boys, well past six months of age, when they began to need supplemental food, and as a result their mortality rate was higher (Ren 1995).

GIRLS MAY RECEIVE LESS ATTENTION FROM PARENTS

Yet another way gender bias manifests is that girls may receive less attention from care providers than boys. Recent initiatives have focused on child-care practices (Engle, Menon and Haddad 1996; Leslie and Paolisso 1989), and their results will need to be examined for gender differential outcomes. An earlier study in Bangladesh, for example, showed that mothers spent more time with their sons than with their daughters (they devoted 62 minutes per day to sons under one year, but only 56 minutes to daughters of the same age), and similar differences occurred at every age up to 5 in the study (Chaudhury 1988).

Attention from parents can be influenced by children's alertness and activity, which have been found to be lower among girls. In Mexico, Chávez and Martínez (1979) found that nutritional supplementation increased children's alertness and activity, and this, in turn, altered parents' interaction with their children. Children who received supplements explored more and demanded more attention, and their parents responded by speaking to them more often. The authors showed that the benefits of supple-

ments were more noticeable for girls than for boys because girls tended to limit their movement and choices, and therefore had more to gain from an intervention that increased their activity levels.

A similar result was found in Guatemala, where attendance over time at a food supplementation center increased both girls' tendency to explore and their interest in their environment (Engle, Yarbrough and Klein 1983). Increased mobility and intellectual stimulation for girls may have contributed to the better school performance among supplemented than unsupplemented girls in subsequent years. In a review of 18 longitudinal nutrition intervention studies, Engle and Levin (1984) concluded that girls' mental development was enhanced more than boys' by nutritional supplementation, whereas it enhanced boys' physical development more than it did girls'.

FIRST-BORN GIRLS MAY BE HEALTHIER THAN THEIR YOUNGER SISTERS

At the family level, birth order can be a major factor in girls' health and nutrition. In Bangla- desh, for example, incidence of marasmus was higher if there was a sibling less than 5 years old, and this relationship was stronger for girls than boys (Henry et al. 1993). In Narangwal, India, children had lower weight and height as the number of siblings increased; this finding was especially true for girls (Pebley 1984). In Tanzania, the number of children in the household under 5 years old was indirectly related to weight-for-height (wasting), and this result was more pronounced among girls (Mbago and Namfua 1992). In China, there are negative effects of higher birth order on survival, and this is truer for girls than boys, especially in the neonatal period (Ren 1995). After China's one-child policy began in 1979, the pressure to produce a son increased, resulting in even higher mortality rates for female infants.

INCREASING HOUSEHOLD INCOME AND INCREASING MOTHERS' EDUCATION ARE NOT SUFFICIENT TO REDUCE GENDER DISPARITIES

Although it can generally be said that child health and nutritional status is better in households with higher income and educated mothers (Joshi 1994; Strauss 1990) and that girls fare worse than boys in poor families with uneducated mothers (e.g., Koenig and D'Souza 1986), it cannot be assumed that gender disparities decrease when household income or mothers' education increase.

Numerous instances were found in which boys fared better than girls as household income or mothers' education increased, which actually indicates an *increase* in gender disparity. Longitudinal data from the Helen Keller International Nutritional Surveillance Project in Bangladesh show that girls aged 6 months to 5 years are consistently less well nourished than boys regardless of socioeconomic status (as measured by landholding), season (related to agricultural production), or mothers' education (Figure 4; HKI 1994). There were also examples in which girls fared better than boys and gender disparities were decreased after increases in household income or mothers' education, but these instances were fewer.[3]

Studies in Bangladesh (Chen, Huq and D'Souza 1981) and India (Das Gupta 1987) found that even in families with moderate income and educated mothers, young girls had higher than expected mortality and morbidity compared with boys, and that boys benefited more than girls from increases in household income

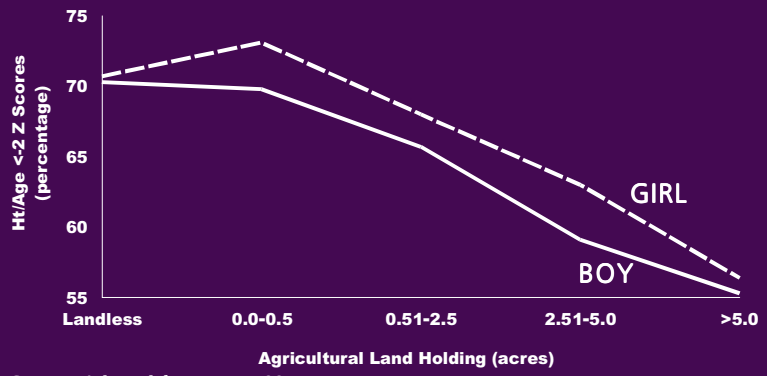
[3] Note that another possible result is that the health and nutritional status of boys and girls may benefit similarly as household income or mothers' education increases. This would mean that the gender differential is not changing, even if children's status is improving in the aggregate. In statistical terms, sex would not be a significant variable related to increasing incomes. This result did not emerge from the standard literature search based on the key word "gender," but would probably emerge from a more general literature review.

and mothers' education. Henry et al. (1993) in Bangladesh found that an increase in mothers' education from one to five years was associated with a 45 percent reduction in mortality among sons, but with only a 7 percent reduction among daughters. Increased income was also associated with a reduced prevalence of marasmus among boys under 18 months, but not girls. Similarly, in Bangladesh, mothers' education was positively related to weight-for-age of sons, but not daughters (Bhuiya et al. 1986). In a study of low-income families in Jordan, mothers' education was associated with shorter duration of breastfeeding, and breastfeeding was shortened more often for girls than boys (Tekce and Shorter 1984). Shorter breastfeeding duration is likely to be associated with poorer health among the girls than among the boys. Investigators in Côte d'Ivoire found that increased women's income improved the height-for-age of boys more than for girls, and speculated that mothers might be investing more in sons because sons provide financial support during mothers' later years (Haddad and Hoddinott 1994).

Girls fared better than boys in a study in Panama. Barbeau (1987) found that an increase in women's

Figure 4.
Differences in Nutritional Status in Bangladesh: HKI Nutritional Surveillance Project

Stunted Children by Land Holding Size, August 1991–February 1994

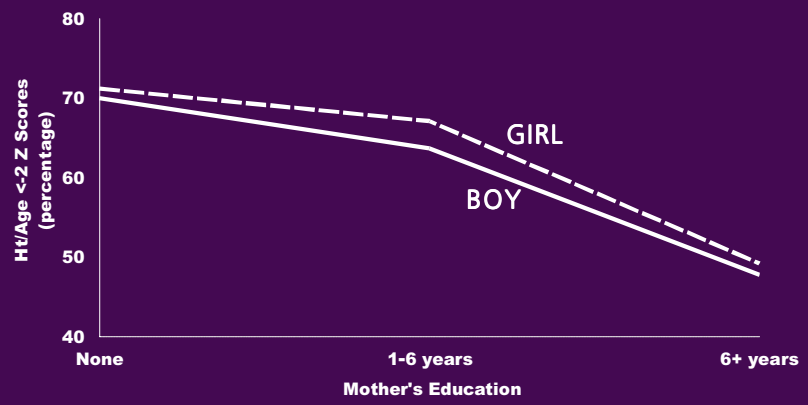


Source: Adapted from HKI 1994

Underweight Children by Season, February 1991–October 1994

Source: Adapted from HKI 1994

Stunted Children by Mother's Education, August 1991–February 1994



Source: Adapted from HKI 1994

earnings led to an increase in household food purchases that improved the energy intake of girls more than of boys. An analysis of data from the 1981 census of India indicated that mothers' education benefited girls 1 to 5 years old more than boys, especially in the northern states, though it benefited boys more than girls during infancy (Bourne and Walker 1991). In three provinces in China, mortality rates among one- to four-year-olds were higher among girls than boys, but this gender differential decreased with greater maternal education (Ren 1995).

INTERVENTIONS CAN BE DESIGNED AND IMPLEMENTED TO OVERCOME GENDER BIASES

Three intervention research studies have explored, tested, and documented the delivery of services that redress gender inequities in health and nutrition. These studies are based in Matlab Thana, Bangladesh, conducted by the International Center for Diarrheal Diseases Research in Bangladesh (ICDDR,B) in Narangwal, India, as reviewed in Pebley 1984; and the Tamil Nadu Integrated Nutrition Program in India (Shekar, Habicht and Latham 1992). Pebley (1984) also reviewed findings from the nutrition intervention study in El Progreso, Guatemala, but found that gender differences in nutritional status and mortality were negligible.

ICDDR,B has been working in Matlab Thana for more than 20 years. In one study, sets of villages were selected to receive interventions or serve as controls. Activities in the two sets of villages differed primarily in intensity and included tetanus and measles immunizations, prenatal care and birth attendant training, and distribution of free contraceptives. Control villages also received some basic services, including distribution of oral rehydration packets. A lower percentage of girls died in the intervention villages than in the control villages, although girls 6 to 36 months had higher mortality rates than boys, particularly in post-monsoon seasons, and were twice as likely to die from malnutrition. The reduction in the intervention villages was related not only to the health and nutrition services, but also to the program's educating families to stop giving males preference in feeding and health care. The authors suggested that programs would have a greater impact on girls if they also invested in food availability, income generation, mothers' general education, and water and sanitation (Fauveau et al. 1990; Pebley 1984).

The study in Narangwal, India, provides additional insights into outcomes of interventions differing by gender. For this study, 26 rural communities participated in two overlapping intervention schemes that targeted children 0 to 36 months of age: a population project providing family planning and health care services and a nutrition project including growth monitoring, nutrition education, and nutritional supplementation. Baseline data indicated that boys were breastfed longer, had higher nutrient intake, were taller and heavier, had fewer symptoms of gastrointestinal illness, and received care more quickly when ill than did girls. The project tested whether single interventions or a combination of interventions led to better health, nutrition, and mortality outcomes.

Following the interventions, the reduction in mortality among males and females was compared among the interventions (Table 4). The second and third columns of Table 4 show the male:female mortality ratio before and after the intervention. In all cases the ratio is less than 1, indicating that fewer boys were dying than girls. But the ratio is closer to

1 after the interventions, indicating improvement for girls. The fourth column of the table shows that the combined intervention (health care plus nutrition) led to the greatest change in those ratios—that is, the greatest reduction in gender differences in mortality compared with single interventions or the control group. The authors concluded that combined health and nutrition interventions are needed to benefit girls, and that careful follow-up of undernourished children by project fieldworkers was an important factor in the improvement of girls' health and nutrition (Pebley and Amin 1991; Pebley 1984).

Shekar and colleagues (1992) provide further suggestions about strategies that might be most effective in reducing gender differential outcomes. In a subsample of the Tamil Nadu Integrated Nutrition Program (TINP) study of 100 children 6 to 36 months old who grew poorly, 120 who grew at an average rate, and 100 who grew well (based on ranges of weight-for-age), poor growers ("negative deviants") were characterized as female, having diarrhea, having lower family wealth, being breastfed a shorter duration, and having a poor diet. Conversely, good growers ("positive deviants") had greater family wealth and were breastfed longer. It is noteworthy that the positive and negative deviants are not mirror images of each other; thus, interventions need to be tailored to meet the specific characteristics of children who grow poorly. The researchers suggested that to improve the nutritional status of the negative deviants, mostly girls, programs should focus on improving child care and breastfeeding practices, controlling diarrhea episodes, and empowering mothers.

Table 4.
Male:Female Mortality Ratios in the Narangwal Study

Group	Before Intervention M:F ratio	During Intervention M:F ratio	Change in ratio
Health Care	.63	.78	1.24
Nutrition	.49	.73	1.49
Health Care and Nutrition	.46	.83	1.80
Control	.63	.71	1.13

Source: Adapted from Pebley and Amin 1991

This review revealed that gender differences in the health and nutrition of underfives exist in every region and were found more often in smaller studies than in national-level statistics. Bias against girls was shown consistently in three health and nutrition areas: health care utilization, feeding patterns, and attention from care providers. In some reports, it was also evident that girls of higher birth order fared worse than first-born girls. There were also examples of gender differences in morbidity and nutri- tional status, with Helen Keller International's Nutritional Surveillance Project in Bangladesh providing a good set of longitudinal data (HKI 1994).

Furthermore, the literature suggested gender bias in mortality. The DHS country reports addressed gender bias in mortality most completely, particularly after statistical adjustments were made as suggested by Hill and Upchurch (1995). Across a number of these health and nutritional outcomes were the disappointing implications that two major development interventions—increasing the household income of poor families and increasing mothers' education—do not necessarily lead to reductions in gender disparities among children under 5 years old. And finally, the evidence suggests that health and nutrition interventions can reduce gender differentials in health and nutrition. Key elements seem to be combining several interventions and having field- workers do careful follow-up.

Combining information from three kinds of sources, we believe, was a unique contribution to addressing the questions posed. From the review of six health and nutrition journals, we learned that only one-third of articles disaggregate their findings by gender, which suggests that caution is warranted about drawing final conclusions when so much of the data is incomplete. In the other two-thirds of the articles, possible gender differences seem not be considered, and this oversight seriously limits an examination of gender bias in children under age 5. The national-level reports also provided limited gender disaggregation. The review of six journals also indicated that for a given health or nutrition indicator data might show gender bias against either boys or girls or no statistical difference between the genders. These findings would not have emerged had we only performed a traditional literature search using the key word "gender" because, among articles describing underfive health and nutrition, the key word "gender" tends to be assigned only to results that are disadvantageous for girls. The traditional search, however, was an essential complement to the other sources, because it provided almost all the information on the factors related to gender bias disadvantageous to girls. This search was particularly important since the review of health and nutrition journals yielded only one article relevant to the description of factors influencing gender bias in underfive health and nutrition.

We are also cautious about discussing factors related to gender bias and the context in which it can occur because we found so few qualitative data from the health and nutrition studies to complement the quantitative data. Some authors speculated about reasons for quantitative gender differences found but did not usually provide careful data collection to confirm their speculations. Many speculated about the "sociocultural mileau," but did not explain its components.

In particular, there was little qualitative exploration of the perceptions of parents and others responsible for the well-being of children. Sons are reportedly preferred because they are perceived to be economic and labor assets, they continue the family line and inherit its wealth, and in some cultures because they meet religious requirements. Daughters may be perceived as economic burdens if a dowry must be paid for their marriage or if they leave home after marriage (Miller 1994). How this information applies to children's health and nutrition needs to be understood so that effective interventions can be designed to reduce gender differences in care while improving the health and nutrition of both boys and girls.

It is important to note that the three topics on which gender bias was the most apparent—health care utilization, feeding patterns, and child care practices—are all sets of behaviors of those who care for children or who influence that care. There are no strong innate biological components to these variables, whereas morbidity, nutritional status, and mortality have both biological and behavioral components. The key to correcting gender bias against girls seems to lie in changing the factors that drive biased child care behaviors and then ultimately changing these behaviors and their underlying influences.

For this paper, it was not possible to quantify the extent of gender disparity in health and nutritional status in a single figure, as expected. Units of measurement differed across studies, which made comparisons or compilations impossible. Also, studies were not representative, with the exception of the DHS by country and by state in India. To our knowledge, the DHS data have not been analyzed in detail for gender disparities, except in mortality.

For the same reason, the extent of disparity could not be compared across regions either. Several trends are notable, however, if interpreted with caution. One of our main conclusions from the review of the six journals is that gender differences can occur anywhere because they were noted in every region. When we searched on key words "gender" and others, on the other hand, although we also found evidence of gender disparity from every region, there was a predominance of evidence from South Asia, especially India and Bangladesh. However, gender bias against girls has clearly been studied more extensively (and published in English) in South Asia than in other regions, so no conclusions should be drawn here. Girls in China also suffer from gender bias, but the amount of documentation about this bias in English seems far less than for South Asia. The amount of documentation may also be limited for the Middle East and North Africa.

More investigation in other regions is needed to determine whether gender disparities in underfive health and nutrition are truly more widespread and of greater magnitude in South Asia, or if this impression exists simply because the weight of evidence points there.

Given how little effort seems to be directed toward identifying and reducing gender differences in the health and nutrition of underfive children, and given how much field-based practical information is missing on the causes and perceptions within households of these differences, USAID child survival efforts are well placed to help improve the well-being of both girls and boys and to help narrow any disparities between them. Moreover, given the large network of child survival efforts already in place and the variety of approaches already taken within them, adding an awareness of the disadvantage girls sometimes suffer in health and nutrition would not require many more resources. However, a well-considered strategic plan would be required. To approach the effort of identifying and reducing these gender differences, the following process is recommended:

1. Pose and answer the question: Are there gender-biased behaviors or gender-differential outcomes?

It is strongly recommended that whenever data are being or have been collected at the national, subnational, or community level, they should be disaggregated by gender and the results reported whether gender differences occurred or not. This process should also occur for birth order. These results should be presented in the USAID Child Survival reports prepared for the U.S. Congress, and used in child survival programming. When no data exist, rapid assessment procedures—both quantitative (e.g., clinic record) and qualitative (e.g., focus groups)—should be used to discover any gender differences in underfive health and nutrition.

2. Ask why the gender differences occur.

If the data reveal gender bias, additional assessments are warranted to explore why these biases might occur and to identify possible entry points for addressing them. Studies to identify contributing factors should be supported, especially on aspects of family and social situations that would lend themselves to child survival interventions. Data from the community or clinic level are of somewhat greater interest than national data, because gender bias tends to show up at the regional or local level, but to be diluted at the national level. To elicit the best information about why gender differences occur, a combination of study designs and methods is recommended to give the clearest picture: rapid assessment procedures in the short term and studies to establish causality over several years in the medium term.

3. Develop and test interventions to reduce gender differences.

Because it is not always clear where and how to intervene, operations research studies are recommended to identify and test solutions that address factors thought to contribute to gender differences in health and nutrition. The intervention studies mentioned earlier can serve as a model, particularly when addressing multiple factors. Studies should compare the efficacy and cost-effectiveness of several different interventions. For example, different messages might be devised and tested to persuade parents to bring their daughters for health care services as often and as early in their illness as their sons. Where full-scale operations research studies are not

possible–for example, in program settings–efforts should be made to reduce gender differences and the results evaluated in the most rigorous way possible.

4. Share lessons learned and develop a consensus about reducing gender differences.

If the research literature with gender-disaggregated health and nutrition data is sparse, documented attempts at reducing gender differences were even harder to find. Others might learn from those who have taken steps to reduce gender differences. Their results might be scaled up or replicated. Developing a series of case studies is recommended. Negative and positive findings should be included, so that lessons can be learned about what did and did not work.

Once findings are available from operations research studies and case studies, it is strongly recommended that they be disseminated to those who can make a difference in children's lives. These audiences include communities, in-country public institutions, non-governmental organizations, community-based organizations, research institutions, and international agencies. With such dissemination, lessons learned can be replicated and an informed constituency can develop to advocate for investments to reduce gender-biased differential outcomes.

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TABLE A.1.
MORTALITY RATES FOR MALE AND FEMALE CHILDREN 0–5 YEARS: DATA FROM DEMOGRAPHIC AND HEALTH SURVEYS

Survey	Country	Year of Survey	Infant Mortality Rate		Child Mortality Rate		Underfive Mortality Rate	
Phase			Male	Female	Male	Female	Male	Female
	Sub-Saharan Africa							
DHS-I	Botswana	1988	46	31	18	16	64	47
DHS-II	Burkina Faso	1992/93	115	100	107	110	209	200
DHS-I	Burundi	1987	97	74	102	112	189	178
DHS-II	Cameroon	1991	86	75	64	75	145	144
DHS-III	Ghana	1993	79	70	63	62	138	128
DHS-III	Kenya	1993	67	59	33	33	97	89
DHS-I	Liberia	1986	169	135	91	94	245	217
DHS-II	Madagascar	1992	103	102	85	82	180	175
DHS-II	Malawi	1992	141	130	125	114	249	230
DHS-I	Mali	1987	137	126	167	172	281	276
DHS-II	Namibia	1992	67	57	30	34	94	89
DHS-II	Niger	1992	136	133	212	232	319	334
DHS-II	Nigeria	1990	94	89	118	102	200	182
DHS-II	Rwanda	1992	98	82	87	73	176	149
DHS-II	Senegal	1992/93	83	69	96	80	171	143
DHS-I	Sudan (North)	1989/90	84	70	62	63	141	129
DHS-II	Tanzania	1991/92	104	95	63	57	160	147
DHS-I	Togo	1988	89	79	75	91	156	163
DHS-I	Uganda	1988/89	111	101	96	86	196	178
DHS-II	Zambia	1992	106	90	91	85	188	168
DHS-I	Zimbabwe	1988/89	63	50	29	31	91	79
	Middle East and North Africa							
DHS-II	Egypt	1992	84	75	25	36	107	109
DHS-II	Jordan	1990	36	37	6	6	42	43
DHS-II	Morocco	1992	69	57	21	24	88	80
DHS-I	Tunisia	1988	56	55	18	19	73	73
DHS-II	Yemen	1991/92	106	90	41	47	142	133
DHS-III	Turkey	1993	71	66	12	14	82	79
	Asia							
DHS-III	Bangladesh	1993/94	107	93	47	62	149	150
DHS-II	Indonesia	1991	80	68	36	35	113	100
DHS-II	Pakistan	1990/91	102	86	22	37	122	119
DHS-III	Philippines	1993	44	33	28	25	70	57
DHS-I	Sri Lanka	1987	40	25	10	10	50	35
DHS-I	Thailand	1987	46	31	11	12	56	42
	Latin America and the Caribbean							
DHS-III	Bolivia	1993/94	91	82	53	47	139	125
DHS-II	Brazil (NE)	1991	111	75	17	20	126	94
DHS-II	Colombia	1990	27	27	11	6	38	32
DHS-II	Dom. Rep.	1991	53	35	18	20	70	55
DHS-I	El Salvador	1985	81	60	17	19	96	77
DHS-I	Guatemala	1987	90	69	44	46	129	111
DHS-I	Mexico	1987	60	52	15	17	74	68
DHS-II	Paraguay	1990	38	32	10	12	47	43
DHS-II	Peru	1991/92	68	59	29	31	95	88
DHS-I	Trinidad	1987	28	33	3	4	32	36

TABLE A.2.
PERCENTAGE OF MALE AND FEMALE CHILDREN 0–5 YEARS FOR WHOM MEDICAL CARE WAS SOUGHT FOR DIARRHEA, FEVER, OR ACUTE RESPIRATORY INFECTION: DATA FROM DEMOGRAPHIC AND HEALTH SURVEYS

Survey Phase	Country	Year of Survey	Medical Facility/Health Provider for					
			Diarrhea		Fever		Acute Respiratory Infection	
			Male	Female	Male	Female	Male	Female
	Sub-Saharan Africa							
DHS-I	Botswana	1988	45	47	85	95	83	82
DHS-II	Burkina Faso	1992/93	13	16	20	19	18	19
DHS-I	Burundi	1987	38	39	51	49	35	37
DHS-II	Cameroon	1991	20	21	45	37	51	42
DHS-III	Ghana	1993	26	22	44	46	43	35
DHS-III	Kenya	1993	45	37	49	46	52	51
DHS-I	Liberia	1986	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Madagascar	1992	34	36	48	45	39	44
DHS-II	Malawi	1992	49	41	47	46	47	51
DHS-I	Mali	1987	3	2	5	1	N/A	N/A
DHS-II	Namibia	1992	68	68	64	65	67	67
DHS-II	Niger	1992	10	10	12	10	16	11
DHS-II	Nigeria	1990	24	27	32	28	33	37
DHS-II	Rwanda	1992	23	23	33	28	32	29
DHS-II	Senegal	1992/93	24	23	33	28	28	27
DHS-I	Sudan (North)	1989/90	54	54	N/A	N/A	66	64
DHS-II	Tanzania	1991/92	57	62	56	58	66	65
DHS-I	Togo	1988	24	27	31	31	33	34
DHS-I	Uganda	1988/89	14	16	50	47	54	52
DHS-II	Zambia	1992	56	53	61	61	61	63
DHS-I	Zimbabwe	1988/89	34	33	N/A	N/A	53	57
	Middle East and North Africa							
DHS-II	Egypt	1992	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Jordan	1990	50	50	N/A	N/A	N/A	N/A
DHS-II	Morocco	1992	10	11	18	19	20	16
DHS-I	Tunisia	1988	32	25	N/A	N/A	N/A	N/A
DHS-II	Yemen	1991/92	35	31	N/A	N/A	N/A	N/A
DHS-III	Turkey	1993	26	24	N/A	N/A	36	39
	Asia							
DHS-III	Bangladesh	1993/94	20	21	N/A	N/A	30	25
DHS-II	Indonesia	1991	47	46	7	6	66	62
DHS-II	Pakistan	1990/91	43	54	67	63	68	65
DHS-III	Philippines	1993	32	36	42	45	52	51
DHS-I	Sri Lanka	1987	76	69	N/A	N/A	N/A	N/A
DHS-I	Thailand	1987	43	90	N/A	N/A	N/A	N/A
	Latin America and the Caribbean							
DHS-III	Bolivia	1993/94	33	31	N/A	N/A	46	41
DHS-II	Brazil (NE)	1991	29	19	37	35	30	35
DHS-II	Colombia	1990	53	38	68	60	71	63
DHS-II	Dom. Rep.	1991	31	29	45	44	44	42
DHS-I	El Salvador	1985	N/A	N/A	N/A	N/A	N/A	N/A
DHS-I	Guatemala	1987	17	16	N/A	N/A	N/A	N/A
DHS-I	Mexico	1987	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Paraguay	1990	51	54	64	62	70	69
DHS-II	Peru	1991/92	31	25	N/A	N/A	49	47
DHS-I	Trinidad	1987	42	59	N/A	N/A	N/A	N/A

TABLE A.3.
PERCENTAGE OF MALE AND FEMALE CHILDREN 0–5 YEARS WITH IMMUNIZATIONS: DATA FROM DEMOGRAPHIC AND HEALTH SURVEYS

Survey Phase	Country	Year of Survey	Vaccination Cards		Vaccination									
					BCG *		DPT3*		Polio3		Measles		All	
			Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
	Sub-Saharan Africa													
DHS-I	Botswana	1988	74	75	99	99	95	93	92	92	93	92	88	88.6
DHS-II	Burkina Faso	1992/93	71	75	84	87	40	42	40	43	58	61	34	35
DHS-I	Burundi	1987	66	62	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Cameroon	1991	57	47	76	75	51	45	51	49	58	54	42	39
DHS-III	Ghana	1993	69	67	85	81	63	61	63	61	63	66	53	57
DHS-III	Kenya	1993	68	70	97	96	87	87	87	86	83	84	78	79
DHS-I	Liberia	1986	34	34	81	81	25	23	23	21	53	54	16	15.4
DHS-II	Madagascar	1992	62	56	79	71	57	50	57	50	56	52	44	42
DHS-II	Malawi	1992	85	88	96	98	88	89	88	89	86	85	82	82
DHS-I	Mali	1987	12	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Namibia	1992	71	70	92	91	69	70	69	70	77	74	58	58
DHS-II	Niger	1992	34	37	38	42	18	23	19	22	26	31	16	19
DHS-II	Nigeria	1990	31	39	60	62	34	33	34	33	46	46	31	28
DHS-II	Rwanda	1992	88	87	98	96	92	91	92	91	91	91	87	88
DHS-II	Senegal	1992/93	64	65	81	87	56	62	57	62	56	59	46	52
DHS-I	Sudan (North)	1989/90	48	45	78	75	61	59	62	60	62	60	53	50
DHS-II	Tanzania	1991/92	79	77	96	95	79	81	75	79	81	81	69	73
DHS-I	Togo	1988	65	67	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DHS-I	Uganda	1988/89	51	48	98	98	59	55	59	56	73	70	50	45.1
DHS-II	Zambia	1992	75	76	96	95	77	77	77	76	77	77	66	67
DHS-I	Zimbabwe	1988/89	77	78	98	98	92	93	92	92	92	94	85	86.8
	Middle East and North Africa													
DHS-II	Egypt	1992	56	55	89	90	78	75	80	78	82	81	69	66
DHS-II	Jordan	1990	64	64	17	17	94	95	95	96	89	90	88	88
DHS-II	Morocco	1992	66	65	94	92	81	78	81	78	89	80	76	76
DHS-I	Tunisia	1988	77	77	99	96	95	89	95	89	93	88	89	79
DHS-II	Yemen	1991/92	23	21	59	62	49	46	49	46	51	52	46	44
DHS-III	Turkey	1993	43	39	87	92	77	77	78	77	78	78	63	67
	Asia													
DHS-III	Bangladesh	1993/94	48	42	88	82	68	64	69	65	73	65	62	56
DHS-II	Indonesia	1991	37	33	75	72	57	56	56	55	57	58	48	48
DHS-II	Pakistan	1990/91	31	29	73	67	45	40	46	40	55	46	39	31
DHS-III	Philippines	1993	35	35	92	91	80	80	78	78	81	82	71	72
DHS-I	Sri Lanka	1987	84	80	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DHS-I	Thailand	1987	38	34	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Latin America and the Caribbean													
DHS-III	Bolivia	1993/94	39	32	79	75	46	40	51	45	60	51	40	33
DHS-II	Brazil (NE)	1991	69	68	79	74	68	69	79	77	81	86	57	56
DHS-II	Colombia	1990	54	63	94	93	80	82	81	84	80	82	67	68
DHS-II	Dom. Rep.	1991	60	62	66	73	63	67	64	70	66	73	32	42
DHS-I	El Salvador	1985	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DHS-I	Guatemala	1987	54	55	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DHS-I	Mexico	1987	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Paraguay	1990	49	51	66	66	51	53	49	55	55	59	30	37
DHS-II	Peru	1991/92	51	51	90	91	69	68	71	69	72	76	57	59
DHS-I	Trinidad	1987	78	81	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N.A

*BCG is for protection against tuberculosis; DPT is for protection against diptheria, pertussis, and tetanus.

TABLE A.4.
PERCENTAGE OF MALE AND FEMALE CHILDREN 0–5 YEARS WITH LOW NUTRITIONAL STATUS: DATA FROM DEMOGRAPHIC AND HEALTH SURVEYS

Survey Phase	Country	Year of Survey	Stunting Height/Age <-2SD*		Wasting Weight/Height <-2SD*		Underweight Weight/Age <-2SD	
			Male	Female	Male	Female	Male	Female
	Sub-Saharan Africa							
DHS-I	Botswana	1988	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Burkina Faso	1992/93	31	28	13	13	31	29
DHS-I	Burundi	1987	48	47	6	5	37	38
DHS-II	Cameroon	1991	25	23	3	2	12	15
DHS-III	Ghana	1993	28	24	12	11	29	26
DHS-III	Kenya	1993	36	30	6	5	24	2
DHS-I	Liberia	1986	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Madagascar	1992	53	49	5	4	40	38
DHS-II	Malawi	1992	51	47	6	5	28	26
DHS-I	Mali	1987	24	24	14	9	30	31
DHS-II	Namibia	1992	30	27	9	9	27	26
DHS-II	Niger	1992	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Nigeria	1990	43	43	10	8	36	36
DHS-II	Rwanda	1992	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Senegal	1992/93	23	20	10	8	21	11
DHS-I	Sudan (North)	1989/90	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Tanzania	1991/92	48	45	6	5	29	29
DHS-I	Togo	1988	22	18	6	4	19	18
DHS-I	Uganda	1988/89	47	42	2	2	23	23
DHS-II	Zambia	1992	41	38	5	5	26	25
DHS-I	Zimbabwe	1988/89	31	29	2	1	14	12
	Middle East and North Africa							
DHS-II	Egypt	1992	25	24	3	3	10	9
DHS-II	Jordan	1990	20	19	4	2	7	6
DHS-II	Morocco	1992	23	22	3	2	10	8
DHS-I	Tunisia	1988	17	19	4	2	11	10
DHS-II	Yemen	1991/92	N/A	N/A	N/A	N/A	N/A	N/A
DHS-III	Turkey	1993	19	19	3	3	9	10
	Asia							
DHS-III	Bangladesh	1993/94	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Indonesia	1991	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Pakistan	1990/91	51	49	10	8	41	40
DHS-III	Philippines	1993	N/A	N/A	N/A	N/A	N/A	N/A
DHS-I	Sri Lanka	1987	26	29	12	12	37	38
DHS-I	Thailand	1987	21	22	6	5	19	17
	Latin America and the Caribbean							
DHS-III	Bolivia	1993/94	28	28	6	3	16	15
DHS-II	Brazil (NE)	1991	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Colombia	1990	24	21	0.8	1	11	13
DHS-II	Dom. Rep.	1991	N/A	N/A	N/A	N/A	N/A	N/A
DHS-I	El Salvador	1985	N/A	N/A	N/A	N/A	N/A	N/A
DHS-I	Guatemala	1987	59	57	1	2	33	34
DHS-I	Mexico	1987	N/A	N/A	N/A	N/A	N/A	N/A
DHS-II	Paraguay	1990	17	16	0	0	3	4
DHS-II	Peru	1991/92	37	36	2	1	12	10
DHS-I	Trinidad	1987	5	5	4	4	6	7

*These columns indicate the percentage of children who are considered stunted because their height is less than 2 standard deviations below that of the National Center for Health Statistics (NCHS) reference data for their age.

TABLE B.1.
MORTALITY RATES FOR MALE AND FEMALE CHILDREN 0–5 YEARS: DATA FROM NATIONAL FAMILY HEALTH SURVEYS*

Indian States	Year of Survey	Infant Mortality Rate		Child Mortality Rate		Underfive Mortality Rate	
		Male	Female	Male	Female	Male	Female
Himachal Pradesh	1992	67	63	18	25	84	87
Andhra Pradesh	1992	78	69	22	28	98	95
Madhya Pradesh	1992	100	93	47	57	142	144
Gujarat	1993	72	75	27	39	97	110
Orissa	1993	127	112	16	23	141	132
Haryana	1993	76	84	18	43	93	123
Maharashtra	1992/93	63	49	19	24	80	71
Tamil Nadu	1992	79	62	29	23	106	83
Goa	1992/93	38	29	8	8	45	37
Karnataka	1992/93	79	71	26	33	102	102
Uttar Pradesh	1992/93	113	120	38	66	147	178
Delhi	1993	60	64	14	21	73	84
Rajasthan	1992/93	74	79	27	42	98	118
Kerala	1992/93	34	28	10	9	44	37

*Surveys of the states of India were conducted by DHS-Macro International (Columbia, Maryland) and the International Institute for Population Sciences (Bombay, India).

TABLE B.2.
PERCENTAGE OF MALE AND FEMALE CHILDREN 0–5 YEARS FOR WHOM MEDICAL CARE WAS SOUGHT FOR DIARRHEA, FEVER, OR ACUTE RESPIRATORY INFECTION: DATA FROM NATIONAL FAMILY HEALTH SURVEYS*

Indian States	Year of Survey	Medical Facility/Health Provider for					
		Diarrhea		Fever		Acute Respiratory Infection	
		Male	Female	Male	Female	Male	Female
Himachal Pradesh	1992	73	68	87	76	79	76
Andhra Pradesh	1992	64	61	73	66	74	62
Madhya Pradesh	1992	67	61	71	57	67	54
Gujarat	1993	68	57	80	72	75	71
Orissa	1993	46	48	58	47	63	48
Haryana	1993	66	65	86	86	85	78
Maharashtra	1992/93	60	63	78	72	84	61
Tamil Nadu	1992	60	50	75	72	67	68
Goa	1992/93	69	71	88	84	78	88
Karnataka	1992/93	69	59	75	78	72	77
Uttar Pradesh	1992/93	65	66	73	68	73	62
Delhi	1993	67	62	88	81	84	92
Rajasthan	1992/93	54	48	70	53	60	47
Kerala	1992/93	74	67	75	72	85	77

*Surveys of the states of India were conducted by DHS-Macro International (Columbia, Maryland) and the International Institute for Population Sciences (Bombay, India).

TABLE B.3.
PERCENTAGE OF MALE AND FEMALE CHILDREN 0–5 YEARS WITH IMMUNIZATIONS: DATA FROM NATIONAL FAMILY HEALTH SURVEYS*

Indian States	Year of Survey	Vaccination Cards		Vaccinations									
				BCG		DPT3		Polio3		Measles		All	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Himachal Pradesh	1992	48	60	87	82	80	76	81	74	75	68	66	59
Andhra Pradesh	1992	38	32	77	69	69	63	69	67	57	51	47	44
Madhya Pradesh	1992	25	18	59	54	46	41	48	45	44	37	33	25
Gujarat	1993	29	34	76	78	65	63	64	62	57	55	51	48
Orissa	1993	46	36	67	59	60	52	61	52	43	37	38	34
Haryana	1993	34	28	78	76	71	62	72	63	64	58	57	50
Maharashtra	1992/93	40	39	86	88	82	84	81	82	67	74	61	67
Tamil Nadu	1992	38	39	92	71	87	86	85	85	74	69	68	62
Goa	1992/93	76	74	93	94	87	87	87	87	77	78	75	75
Karnataka	1992/93	32	37	83	81	70	71	71	72	53	57	51	54
Uttar Pradesh	1992/93	26	20	52	46	38	30	41	33	28	24	22	17
Delhi	1993	49	42	94	86	74	69	78	72	78	60	65	50
Rajasthan	1992/93	19	13	49	42	33	26	37	29	35	27	24	19
Kerala	1992/93	59	53	89	83	75	73	76	75	64	57	56	53

*Surveys of the states of India were conducted by DHS-Macro International (Columbia, Maryland) and the International Institute for Population Sciences (Bombay, India).

TABLE B.4. PERCENTAGE OF MALE AND FEMALE CHILDREN 0–5 YEARS WITH LOW NUTRITIONAL STATUS: DATA FROM NATIONAL FAMILY HEALTH SURVEYS*

Indian States	Year of Survey	Stunting Height/Age ‹-2SD		Wasting Weight/Height ‹-2SD		Underweight Weight/Age ‹-2SD	
		Male	Female	Male	Female	Male	Female
Himachal Pradesh	1992	N/A	N/A	N/A	N/A	48	46
Andhra Pradesh	1992	N/A	N/A	N/A	N/A	47	51
Madhya Pradesh	1992	N/A	N/A	N/A	N/A	17.6	20
Gujarat	1993	44	43	18	20	42	47
Orissa	1993	48	48	22	21	53	53
Haryana	1993	44	50	6	6	35	42
Maharashtra	1992/93	45	47	20	20	51	54
Tamil Nadu	1992	N/A	N/A	N/A	N/A	43	50
Goa	1992/93	32	31	17	14	36	34
Karnataka	1992/93	47	49	18	16	53	56
Uttar Pradesh	1992/93	50	49	18	14	52	48
Delhi	1993	44	42	13	11	42	42
Rajasthan	1992/93	45	41	20	19	43	41
Kerala	1992/93	27	28	12	11	29	28

*Surveys of the states of India were conducted by DHS-Macro International (Columbia, Maryland) and the International Institute for Population Sciences (Bombay, India).